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(54) Apparatus and method for controlling and/or killing weeds

(57) Apparatus for controlling and/or killing weeds, unwanted growth or the like, said apparatus comprising a reservoir 30 for a liquid such as water, at least one heating element 25 for heating of the liquid, and steam outlet means. The apparatus comprises a boiler 20 in which the at least one heating element is incorporated. The boiler is placed in a lower part (3) of the apparatus, and the reservoir for liquid is connected to the boiler.

By this apparatus, water is heated to steam in a boiler near the ground, whereby the steam has to be transported for only a small distance. Hence, the temperature drop in the steam will be insignificant. As the heating of

the liquid takes place in the lower part (3) of the apparatus, there will be no discomfort to the user due to heated parts or heated liquid being positioned near the body of the user. Further, as heating of the liquid takes place in a separate boiler, only a fraction of the liquid contained in the apparatus has to be heated before the apparatus will be ready for use, and no energy will be wasted to heat a relatively large quantity of liquid which may not even be used for treating weeds.

The invention also relates to a method for producing steam for controlling and/or killing weeds, unwanted growth or the like.

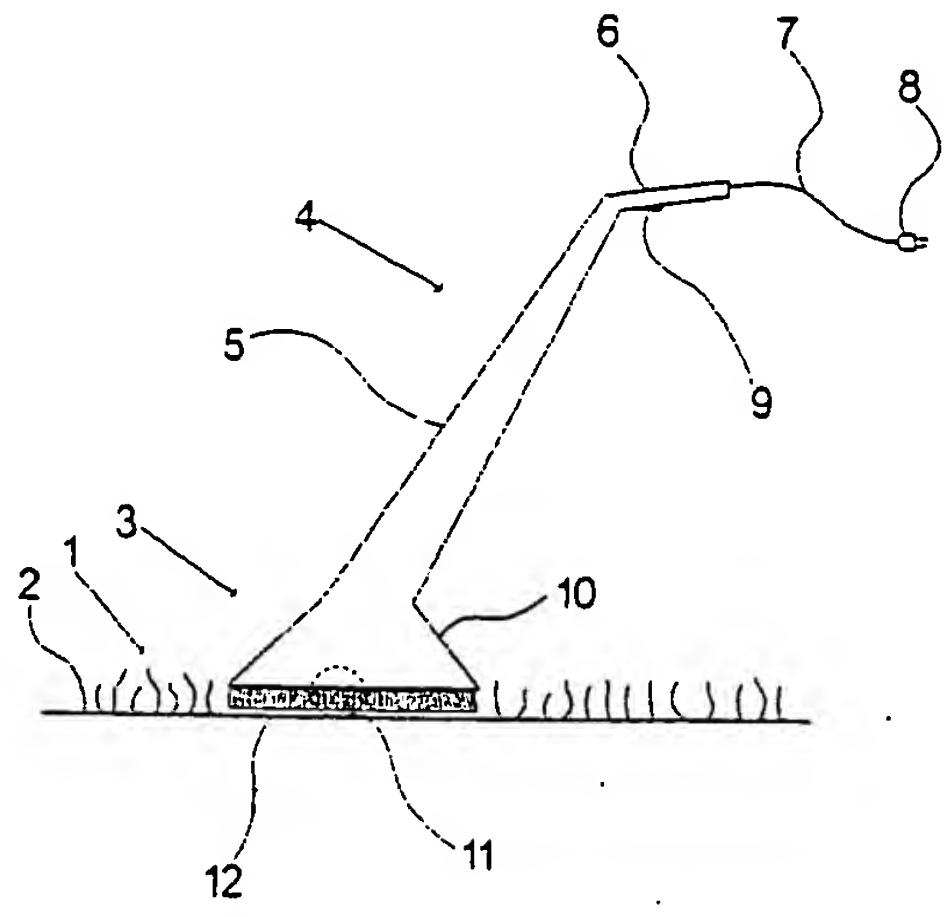


Fig. 1

**Description****Field of the invention**

[0001] The present invention relates to an apparatus for controlling and/or killing weeds, unwanted growth or the like, said apparatus comprising a reservoir for a liquid such as water, at least one heating element for heating of the liquid, and steam outlet means.

**Background of the invention**

[0002] Controlling and/or killing weeds may be done in a number of ways. Conventionally, weeds have been mechanically controlled, for example by removing or cutting down the weeds or by using chemicals to kill them.

[0003] In order to avoid the disadvantages associated with these methods, e.g. labor intensity linked with mechanical removal, environmental pollution associated with chemical control etc., it is known to use heat in the form of for example open fire, hot water or steam to control unwanted growth.

[0004] As the use of open fire, e.g. a torch, presents an inherent risk of inducing a fire, and as the use of hot water requires a considerable amount of water and thus energy in order to achieve a satisfactory result, the use of thermal energy in the form of steam is preferable.

[0005] A number of various weed-killers using steam are known, including portable weed-killers, weed-killers for domestic use and/or for use by a single operator.

[0006] EP 920 802 A discloses such a portable weed-killing apparatus, which has a steam generator in a handle part connected by tubes to a mouthpiece in the lower part of the apparatus. The mouthpiece comprises a chamber, in which steam outlets direct steam into the chamber, thereby creating a hot zone for scorching the weeds, which extends into or is positioned below the chamber.

[0007] The steam generator in this piece of prior art comprises a water reservoir capable of containing 0,5 to 2 l of water. The water is heated by an electric heating element in the water reservoir which means that the entire amount of water must be heated to boiling temperature, before a sufficient amount of steam is produced. Therefore, the apparatus has to be filled with water, the electric power has to be connected and the operator has to wait for the water in the reservoir to be heated to a boiling point before the apparatus may be used for killing weeds.

[0008] As the water reservoir/steam generator is placed in the handle part, the steam will inevitably lose thermal energy during transport from the steam generator through the tubes to the steam outlet in the mouthpiece, thus reducing the efficiency of this known weed-killing apparatus.

[0009] Further, this known weed-killing apparatus has a couple of major disadvantages in that the water res-

ervoir is placed in the handle part which will be positioned near the body of the operator during use, i.e. near the hip or thigh of the operator, and in that the contents of the water reservoir are heated to boiling temperature which may cause some discomfort to the operator. If the boiling water should leak or escape from the water reservoir, for example if the operator stumbles or falls, or if a filling arrangement of the reservoir has not been properly closed or the reservoir has become defective, the operator may even suffer injuries because of the hot or boiling water.

[0010] Finally, this known apparatus has the drawback that if the contents of the water reservoir have not been used, i.e. the water reservoir still contains water once the operator stops using the weed-killing apparatus, the energy used to heat the remaining quantity of water has been wasted which further reduces the energy efficiency of this known weed-killing apparatus.

[0011] WO 99/38378 A discloses a weed-killing apparatus, which has an application head at a lower part of the apparatus and a handle part at the other end of the apparatus. The application head is electrically heated and has steam outlets. A water reservoir is placed in the handle part, and by activating a pump or valve mechanism by a trigger, a small quantity of water is led from the water reservoir through tubes to the application head. Once this small amount of water reaches the hot application head, it vaporizes immediately and escapes through the steam outlets. Before activating the trigger, the operator will have to place the application head above the weed or weeds, whereby steam coming from the steam outlets will be directed towards the weed or weeds.

[0012] Besides being scorched by steam, the weed or weeds will also be damaged by the direct physical contact with the application head and by heat radiation from the application head.

[0013] This known weed-killer is not intended for continuous production of steam and application of steam to weeds, but only for selective treatment of a weed or a spot of weeds as the application head has to be positioned directly above the weed or the weeds to be treated before the trigger is activated, and as water from the reservoir is only released in small quantities each time the trigger is activated.

**Summary of the invention**

[0014] An object of the invention is to provide an improved apparatus for controlling and/or killing weeds, unwanted growth or the like.

[0015] Another object of the invention is to provide an apparatus for controlling and/or killing weeds, unwanted growth or the like, said apparatus not suffering from the drawbacks associated with prior-art.

[0016] A further object of the invention is to provide an apparatus for controlling and/or killing weeds, unwanted growth or the like, said apparatus being suitable

for continuously treating weeds with steam as well as for spot-treatment, while providing the necessary amount of steam at a suitable temperature and with optimal efficiency.

[0017] These objects are met by means of an apparatus according to claim 1, wherein the apparatus comprises a boiler in which the at least one heating element is incorporated, and wherein the boiler is placed in a lower part of the apparatus and wherein the reservoir for liquid is connected to the boiler.

[0018] By an apparatus according to the invention, the water is heated to steam in a boiler placed in a lower part of the apparatus, i.e. near the ground, whereby the steam has to be transported for only a small distance. Hence, the temperature drop of the steam will be insignificant. As the heating of the liquid takes place in the lower part of the apparatus, there will be no discomfort to the user due to heated parts or heated liquid being positioned near the body of the user. Further, as the heating of the liquid takes place in a separate boiler, only a fraction of the liquid contained in the apparatus has to be heated before the apparatus will be ready for use, and no energy will be wasted to heat a relatively large quantity of liquid which may not even be used for treating weeds.

[0019] When, as stated in claim 2, the boiler is placed in a position in the apparatus near ground level, at a distance of 5 - 40 cm and preferably 5 - 10 cm from the ground level, an advantageous embodiment of the invention has been obtained, whereby the distance, which the steam must travel, is of an appropriate length in relation to temperature losses, while simultaneously allowing the steam to spread over an appropriate area after having left the steam outlet means.

[0020] When, as stated in claim 3, the apparatus comprises shielding means at its lower part for applying steam to the weeds, and when the boiler is placed in the vicinity of these shielding means, a preferable embodiment is achieved, whereby the steam led from the boiler is contained in a chamber, and whereby the steam forms a layer or carpet of steam. This ensures that the weed or weeds are subjected to steam for a sufficiently long period of time, while the apparatus is moved along the ground. Further, the positioning of the boiler in the vicinity of the shielding means minimizes thermal loss, both from the boiler and/or from the connection between the boiler and the outlet means.

[0021] When, as stated in claim 4, the apparatus comprises sealing means for preventing or restricting the passage of steam from the inside of the shielding means, said shielding means preferably being in the form of brushes, rubber lips or similar means, a further advantageous embodiment is achieved, whereby the containment of steam inside the shielding is enhanced, which is especially advantageous once the apparatus is moved along an uneven ground level or when the apparatus is used for treating especially sturdy, robust, voluminous or tall weeds. When sealing is in the form of

brushes, the hairs of the brush may adapt flexibly to the ground-below or to the weeds, while at the same time not constituting an unnecessary strong obstacle or force against the forward movement of the weed-killing apparatus.

[0022] When, as stated in claim 5, the steam outlet means is arranged to direct a flow of steam downwards, preferably in a substantially vertical direction, and when the steam outlet means comprises an outlet or a series of outlets arranged in a direction, which is essentially perpendicular to the normal direction of transport of the apparatus, an advantageous embodiment of the apparatus is provided, whereby steam from the outlet means is supplied and creates an essentially uniform layer of steam above the ground and while subjecting the weed or weeds to the steam for a sufficiently long period of time while the apparatus is moved along the ground.

[0023] Preferably, as stated in claim 6, the steam outlet means may comprise a slit-shaped outlet extending substantially transversely in relation to the traveling direction at a distance from the front and the back of the shielding means, whereby the steam will flow downwards and be divided into a stream forward and a stream backwards, both streams covering the full width of the apparatus. Thus, an essentially uniform layer of steam will be created inside the shielding, both to the front of and to the back of the steam outlet. The weed or weeds will thus be subjected to a layer of steam stretching essentially from the front of the shielding to the back of the shielding and covering essentially the whole width of the shielding. Hence an efficient and relatively fast treatment of the weeds is achieved, while the apparatus is moved along the ground.

[0024] When, as stated in claim 7, the steam outlet means is arranged to direct a flow of steam in a substantially horizontal direction, preferably to one or both sides of the apparatus, a further advantageous embodiment is provided, whereby weed or weeds present on one or both sides of the apparatus will be scorched by the steam during movement along the ground. This is especially advantageous when the apparatus is used on areas with vertical or essentially vertical surfaces, e.g. walls of buildings, curbs etc., where weed growing alongside these surfaces can not be treated by the downward stream of steam present under the shielding means of the apparatus, but only by the flow of steam in the essentially horizontal direction.

[0025] When, as stated in claim 8, means for controlling and/or regulating the supply of liquid from the reservoir to the boiler is arranged in relation to the connection between the reservoir and the boiler, a suitable embodiment of the invention is provided whereby it is ensured that the boiler will always contain an appropriate quantity of liquid to be heated.

[0026] When, as stated in claim 9, the controlling and/or regulating means preferably comprises valve means controlled by the liquid level and/or the pressure in the boiler, a suitable embodiment is provided, whereby the

supply of liquid to the boiler is controlled and/or regulated in an advantageous manner.

[0027] When, as stated in claim 10, the boiler comprises a boiler chamber for a liquid, e.g. water, and when the steam outlet duct means leads from an upper part of the boiler chamber to a lower part inside the shielding of the apparatus, an advantageous embodiment is achieved whereby steam from the boiler is led to the outlet means in an optimal manner.

[0028] When, as stated in claim 11, the steam outlet duct means is preferably led through the boiler chamber and positioned substantially vertically, the steam outlet duct means is not subjected to temperatures considerably below the steam temperature. Hence, the steam will not lose energy to the surroundings during transport to the outlet means, i.e. energy is preserved in the steam.

[0029] When, as stated in claim 12, the at least one heating element is positioned in the boiler chamber, preferably around the steam outlet duct means, a further advantageous embodiment is provided whereby heating of the liquid is achieved in an optimal manner and whereby additional heat from the heating element may be transferred to the steam as the steam is transported through the steam outlet duct means to the outlet means.

[0030] When, as stated in claim 13, the apparatus comprises a handle part for manual operation, the handle part stretching down towards the boiler, and when the reservoir for liquid is supported by or incorporated in this handle part, and /or when the reservoir is a structural part of the handle part, a further preferred embodiment is provided, whereby the reservoir for liquid is conveniently situated in or on the apparatus.

[0031] As stated in claim 14, the apparatus may comprise supporting and/or positioning means at its lower part, preferably in the form of one or more wheels or runners, whereby the apparatus may be moved effortlessly along the ground by the user, while simultaneously being supported in a constant and optimal level above ground, thus optimizing the weed-killing and/or controlling effect.

[0032] When, as stated in claim 15, the at least one heating element is preferably an electric heating element or a burner, for example a gas burner, the liquid will be heated by appropriate means.

[0033] As stated in claim 16, the invention also relates to a method of producing steam for controlling and/or killing weeds, unwanted growth or the like, comprising the supply of a liquid from a reservoir to a boiler placed immediately above or at a relatively short distance from the weeds, whereby a number of advantages is achieved.

[0034] By this method, the steam has to be transported for only a small distance after having been produced in the boiler. Hence, the temperature drop in the steam will be insignificant. As the heating of the liquid takes place immediately above or at a relatively short distance

from the weeds, there will be no discomfort to the user due to heated parts or heated liquid being positioned near the body of the user. Further, as the heating of the liquid takes place in a separate boiler, only a fraction of the liquid contained in the apparatus has to be heated, before the apparatus will be ready for use, and no energy will be wasted to heat a relatively large quantity of liquid which may not even be used.

[0035] When, as stated in claim 17, the supply of liquid from the reservoir to the boiler is controlled and/or regulated, preferably in relation to the liquid level and/or the pressure in the boiler, an advantageous embodiment of the method is provided, whereby it is ensured that an appropriate quantity of liquid will be heated in the boiler.

[0036] As stated in claim 18, the liquid in the boiler may preferably be heated by at least one heating element, preferably an electric heating element or a burner, whereby the liquid will be heated by appropriate means according to this embodiment of the invention.

#### The drawings

[0037] The invention will be described below with reference to the drawings of which

- fig. 1 shows a weed-controlling or -killing apparatus according to an embodiment of the invention seen from the side,
- fig. 2 is a sectional enlarged view through the lower part of the weed-controlling or -killing apparatus shown in fig. 1,
- fig. 3 is a sectional view along lines III - III in fig. 2 of the lower part of the steam outlet means, and
- fig. 4 is a sectional and perspective view showing a boiler in a slightly altered embodiment according to the invention.

#### Detailed description

[0038] An apparatus for controlling or killing weeds 1 is shown in fig. 1 from the side. The apparatus comprises a lower part 3 and a handle part 4. The handle part 4 includes a connecting part 5 connected to the lower part 3 of the apparatus and an upper part connected to a handle 6. An electrical wire 7 with an electrical plug 8 for supplying the necessary power is connected to the handle 6. Further, the handle 6 is fitted with an electrical switch 9 for electrical power.

[0039] The lower part of the apparatus comprises a shield 10 for preventing steam from escaping. Further, the lower part comprises wheels 11 for supporting the apparatus on the ground 2. The shield 10 has sealing means at its lower edge in order to enhance the containment of the steam. These sealing means may be in the form of brushes 12, made from a material capable of withstanding the temperature of the steam, or in the form of rubber lips or sealing band, strips or the like made from appropriate materials.



[0040] In fig. 2, a blow-up of a cross-section of the lower part of the weed-killing and/or controlling apparatus is illustrated. The cross-section is from a direction, which is substantially perpendicular to the normal direction of movement for the apparatus.

[0041] A boiler 20 is positioned inside the shielding means 10. This boiler has an outer shell 21, inside which an inner shell 23 with a lower part 22 is positioned. Between these two shell-parts, a boiler cavity is defined, in which a heating element illustrated by e.g. an electric heating element 25 is placed. As illustrated, the boiler cavity is filled with water, a water solution or another suitable liquid 26.

[0042] The inner shell 23 has an opening at the top which leads into an inner cavity 24. This inner cavity 24 is connected to a lower outlet cavity surrounded by walls of which the end walls 28 are illustrated in figure 2. This lower outlet cavity has an opening or series of openings 27 pointing downwards. The opening or openings 27 create(s) a slit-shaped outlet which extends transversely in relation to the traveling direction of the apparatus. The outlet is placed at a distance from the front and the back of the shield 10.

[0043] Above the boiler 20, a liquid or water reservoir 30 is placed inside the handle part 4 and primarily in the connecting part 5 of the handle part as illustrated in fig. 2. The reservoir 30 is connected by means of a tube or pipe 31 to a controlling or regulating valve 32. This valve 32 is connected to the boiler 20 and serves to control or regulate the supply of liquid, e.g. water, to the boiler 20 as will be explained at a later point. The reservoir 20 is preferably capable of containing 0,5 to 3 l of liquid, e.g. water.

[0044] Finally, it is illustrated in figure 2 that the lower edge of the shield 10 is supplied with sealing means 12 in the form of brushes or bristles. However, other forms of sealing means may be utilized, e.g. rubber lips, sealing strips, etc.

[0045] In figure 3, a part-section taken along line III - III shown in figure 2 is illustrated. This section illustrates the lower part of the boiler 20, showing the boiler cavity defined by the outer shell 21 and the inner shell 23, said boiler cavity comprising the heating element 25 being positioned for heating of the liquid or water normally occupying the lower part of this cavity.

[0046] The inner cavity 24 is illustrated by the downward connection via the outlet cavity to the opening or series of openings 27. The opening or series of openings 27 is defined by sidewalls 29 connected to the end walls 28 shown in figure 2. As illustrated, the opening or series of openings 27 constitutes a through- or channel-like opening or an opening, which may be defined as a slit-shaped opening. This outlet opening extends transversely or substantially transversely in relation to the traveling direction and is located at a distance from the front and the back of the shield 10.

[0047] Fig. 4 illustrates an enlarged perspective view of a cross-section corresponding to the section shown

in fig. 2, but shows a slightly different boiler 20 with a valve arrangement 32. The outer shell 21 and the inner shell 23 define a boiler cavity in which an electric heating element 25 similarly to that shown in fig. 2 is placed. The heating element 25 has connecting parts 25a and 25b, which are located in a plug 25c at the top of the outer shell 21. The connecting parts 25a and 25b and the corresponding plug 25c may be located in other parts of the outer shell 21, for example in a side part of the outer shell.

[0048] The inner shell 23 is connected to the lower part 22. This lower part 22 is connected to the end walls 28 and the sidewalls 29, hereby defining the lower outlet cavity connected to the inner cavity 24 of the inner shell 23.

[0049] The end walls 28 have openings 33, which serve, as will be described later, to direct steam in lateral directions. One or more of these openings 33 may be placed at each end wall 28, and the openings 33 may be placed in other positions than those illustrated in fig. 4, e.g. at a higher position on the wall 28 and/or in an angled position, directing the steam slightly forward or backwards and/or downwards or upwards.

[0050] Furthermore, the embodiment shown in fig. 4 differs from the embodiment shown in fig. 2 in that the upper parts of the outer shell 21 are partly inclined at the top resulting in a relatively small volume in the boiler cavity over the liquid. This embodiment has the advantage that the boiler has relatively small outer dimensions at the top, but in cases of boilers with a relatively large heating effect, the embodiment shown in fig. 2 may be advantageous because of the relatively large volume available for steam.

[0051] The valve arrangement 32 is connected to the water reservoir 30 (not shown in fig. 4), and has a connection (not shown) to the boiler cavity, said connection preferably leading from a lower part of the valve arrangement 32 to the boiler cavity through the outer shell 21.

[0052] The function of the illustrated apparatus for controlling or killing weeds will now be explained in detail.

[0053] Water or any other suitable liquid is filled into the reservoir 30, which may or may not be supplied with closing means. Supposing that the boiler cavity between the inner 23 and the outer shell 21 is empty, liquid will pass via the tube or pipe 31 and the valve arrangement 31 into the boiler cavity. Once a sufficient amount of liquid has passed into the boiler cavity, the valve arrangement will close the flow of liquid.

[0054] The apparatus is plugged into the electric mains supply by means of the cable 7 and a plug 8. Once the switch 9 is turned on, the electric heating element 25 will heat the liquid to its boiling point. Steam will pass downwards through the inner cavity 24, which serves as steam outlet duct means. From the inner cavity 24 the steam will leave through the opening or series of openings 27 causing the steam to move downwards. When

in use, the opening or series of openings 27 will be immediately above the ground, and the steam will be directed to both sides of the slit-shaped opening or series of openings 27 and will eventually fill the shielding means 10 with a layer or carpet of steam having a temperature sufficiently high to scorch the weeds, e.g. approximately 80°C or more.

[0055] In addition, a number of openings may be provided at the end of the lower part of the boiler, i.e. at the outlet means, for example openings 33 in the end walls 28 as shown in fig. 4, whereby steam will be directed in a substantially horizontal direction. Weeds growing on the sides of the path of the apparatus will thus also be treated, which is particularly advantageous when the apparatus is used at places with non-horizontal surfaces, e.g. walls, curbstones etc. This embodiment, of course, will also have suitable openings in the shielding means and/or the sealing means 12 for the side steam.

[0056] As the apparatus is moved along the ground, weeds will be subjected to the steam, and since the shielding means covers a predefined horizontal distance, and the apparatus is moved with a suitable velocity above ground by the operator, the weeds will be subjected to the steam for an appropriate period of time, preferably 1 to 2 seconds, which will ensure that the weeds will be scorched, e.g. that a sufficient part of the cells of the weed plants will be destroyed whereby the weeds will dry out and wither within a few days after treatment.

[0057] When an amount of liquid has vaporized, causing the liquid level 26 to drop, the valve arrangement 32 will open and allow a certain amount of water to pass from the reservoir 30 to the boiler causing the liquid level to rise again to normal or maximum level.

[0058] The level of liquid will normally be higher than the highest part of the heating element 25, thereby avoiding harmful temperatures in any part of the heating element 25. However, an upper level is defined by the entrance to the inner cavity 24 and may in fact be even lower due to a certain expected tilt, whereby the liquid will be able to enter the inner cavity. Thus, an upper level will in reality be defined in consideration of an expected maximum tilt of the apparatus.

[0059] The valve arrangement may be configured in a number of ways. However, the valve arrangement will generally serve to maintain the liquid level between the lower and the upper levels, or even to maintain the level at a constant or at a near-constant. The valve arrangement may for example be an on-off-valve or a valve regulating a flow of liquid from the reservoir. The valve arrangement may e.g. be controlled in relation to the liquid level in the boiler cavity, in relation to the liquid pressure in the boiler cavity or in relation to a sensor positioned at a reference level in the boiler. In a preferred form, the valve arrangement may comprise a float arrangement which controls a valve, e.g. a needle valve, which, in turn, controls or regulates the supply of liquid.

[0060] Once the liquid in the reservoir 30 has been

used, the boiler 20 will eventually run dry. In order to avoid overheating of the boiler, e.g. the heating element 25, and thereby damage it, the boiler 20 has an arrangement to switch off the supply of electricity to the heating element 25 or other means to prevent overheating. For example, a thermostat may be provided which switches the electricity off when abnormally high temperatures have been reached. Such a thermostat may e.g. be thermally connected with the plug 25c shown in fig. 4. Another example of preventing overheating may be to configure the heating element as a self-regulating element, e.g. a heating element which attains a higher resistance when temperature rises, thereby reducing the effect of the heating element.

[0061] The apparatus may be provided with an automatic safety device, for example in the form of a dead man's handle, in order to prevent accidents and injury to the operator, for example when the apparatus is placed on the ground or if the operator stumbles and falls causing the power supply to the apparatus to be cut off.

[0062] Further, in addition to or as an alternative to the dead man's handle, the apparatus may be provided with an arrangement to switch off the heating power if the apparatus is tilted beyond a predefined angle in order to prevent accidents and injury to the operator, for example when the apparatus is laid down on the ground or if the operator stumbles and falls. Such an arrangement may comprise a tilt-sensitive switch, e.g. a mercury switch.

[0063] The reservoir 30 may be configured as an independent part placed in or on the handle part or as an integrated part of the boiler 20. It may also serve to strengthen the handle part, or it may even be an integrated part of the handle part, e.g. some of the walls of the reservoir may serve as outer walls of the handle part 4, e.g. the connecting part 5, whereby the weight and volume of the apparatus is reduced.

[0064] As shown on figure 1, the apparatus is supported by wheels 11, for example two wheels with one placed on each side of the boiler 20. One wheel may suffice, or more than two, for example three or four, may be used. The wheel or wheels is/are preferably placed inside the shielding means 10 as illustrated in fig. 1, as this will allow the apparatus to be used very closely to non-vertical surfaces, e.g. walls, curbstones etc. Instead of wheels, other means of support of the apparatus may be used, for example one or more runners, which may be provided in various configurations.

[0065] Generally, the support means serves to maintain the boiler 20, and in particular the outlet openings 27, at a predefined level above ground and to facilitate the transport of the apparatus along the ground. The boiler, e.g. the bottom part of the boiler cavity, is preferably placed at a distance of 5 - 40 cm above ground and preferably at a distance of 5 - 10 cm above ground which will provide an optimal spread of steam inside the shielding means 10.

[0066] The apparatus may optionally be configured in such a manner that it is possible for the user to change the effective width of the lower part of the apparatus, e.g. the width of the steam delivering parts, making the apparatus more flexible. Thus, it will be possible to use the apparatus for killing weeds in places where an apparatus with a normal width can not be used, for example between rows of plants, vegetables etc.

[0067] To achieve this, the shielding means and at least part of the steam outlet means of the boiler may be constructed as exchangeable parts available in a number of different widths, for example in normal width and a smaller width for use between e.g. rows of plants. Other sizes may also be available, even larger than the normal size.

[0068] The exchangeable parts, comprising the shielding means and at least part of the steam outlet means, may be designed as a snap-on-unit incorporating quick-connecting means for attaching the unit to the rest of the apparatus. The exchangeable unit may also comprise other parts of the apparatus, for example supporting means such as wheels, and may even comprise the boiler or part of the boiler.

[0069] The heating element 25 has been shown in the form of an electric heating element supplied with power from the mains supply e.g. from a 230 or 110 V AC supply, whereby an effect of e.g. 2,2 - 2,4 kW may be achieved. Alternatively, the electric heating element may be supplied with power from a rechargeable energy source, for example a battery, placed in the apparatus.

[0070] Instead of an electric heating element, a burner such as a gas burner may be applied to a boiler according to the invention, thereby maintaining the essential features of the invention. One or more burners may be provided in a number of ways apparent to a person skilled in the art in order to heat the liquid in the boiler cavity. If a gas burner is used, the gas may be supplied from one or more gas containers, e.g. gas cans placed in or on the handle part 4, e.g. the connecting part 5, of the apparatus. The gas container or containers may be refillable or may be replaceable, e.g. disposable containers.

[0071] By the description above, it has been specified that the apparatus is intended for use on the ground. It is obvious that ground is defined as any surface on which weeds may grow, e.g. dirt, pavement, gravel surfacing, brick surfacing, asphalt road, concrete etc.

#### Claims

1. Apparatus for controlling and/or killing weeds, unwanted growth or the like, said apparatus comprising a reservoir for a liquid such as water, at least one heating element for heating of the liquid, and steam outlet means characterized in that the apparatus comprises a boiler (20) in which the at least one heating element (25) is incorporated, in that

the boiler is placed in a lower part (3) of the apparatus and in that the reservoir (30) for liquid is connected to the boiler.

2. Apparatus according to claim 1 characterized in that the boiler (20) is placed in a position in the apparatus near a ground level at a distance of 5 - 40 cm and preferably at 5 - 10 cm from ground level.
3. Apparatus according to claim 1 or 2 characterized in that the apparatus comprises shielding means (10) at its lower part (3) for applying steam to the weeds, and in that the boiler (20) is placed in the vicinity of these shielding means.
4. Apparatus according to claim 3 characterized in that the apparatus comprises sealing means for preventing or restricting the passage of steam from the inside of the shielding means, preferably in the form of brushes (12), rubber lips or similar means.
5. Apparatus according to one or more of claims 1 - 4 characterized in that the steam outlet means is arranged to direct a flow of steam downwards, preferably in a substantially vertical direction, and in that the steam outlet means comprises an outlet or a series of outlets (27) arranged in a direction which is essentially perpendicular to the normal direction of transport for the apparatus.
6. Apparatus according to one or more of claims 1 - 5 characterized in that the steam outlet means comprises a slit-shaped outlet (27) extending substantially transversely in relation to the traveling direction at a distance from the front and the back of the shielding means.
7. Apparatus according to one or more of claims 1 - 6 characterized in that the steam outlet means is arranged to direct a flow of steam in a substantially horizontal direction, preferably on one or both sides of the apparatus.
8. Apparatus according to one or more of claims 1 - 7 characterized in that means for controlling and/or regulating the supply of liquid from the reservoir (30) to the boiler (20) is arranged in relation to the connection (31) between the reservoir and the boiler.
9. Apparatus according to claim 8 characterized in that the controlling and/or regulating means comprises valve means controlled by the liquid level and/or the pressure in the boiler.
10. Apparatus according to one or more of claims 1 - 9 characterized in that the boiler (20) comprises a boiler chamber for a liquid (26), e.g. water, and in that steam outlet duct means leads from an upper

part of the boiler chamber to a lower part inside the shielding (10) of the apparatus.

11. Apparatus according to claim 10 characterized in that the steam outlet duct means is led through the boiler chamber and preferably positioned substantially vertically. 5
12. Apparatus according to claim 10 or 11 characterized in that the at least one heating element (25) is positioned in the boiler chamber, preferably around the steam outlet duct means. 10
13. Apparatus according to one or more of claims 1 - 12 characterized in that the apparatus comprises a handle part (4) for manual operation, the handle part stretching down towards the boiler (20), and in that the reservoir (30) for liquid is supported by or incorporated in this handle part, and/or in that the reservoir (30) is a structural part of the handle part (4). 15 20
14. Apparatus according to one or more of claims 1 - 13 characterized in that the apparatus comprises supporting and/or positioning means at its lower part (3), preferably in the form of one or more wheels (11) or runners. 25
15. Apparatus according to one or more of claims 1 - 14 characterized in that the at least one heating element is an electric heating element (25) or a burner, for example a gas burner. 30
16. Method for producing steam for controlling and/or killing weeds, unwanted growth or the like, comprising the supply of a liquid from a reservoir to a boiler placed immediately above or at a relatively short distance from the weeds. 35
17. Method according to claim 16 characterized in that the supply of liquid from the reservoir to the boiler is controlled and/or regulated, preferably in dependency of the liquid level and/or the pressure in the boiler. 40
18. Method according to claim 16 or 17 characterized in that the liquid in the boiler is heated by at least one heating element, preferably an electric heating element or a burner. 45 50

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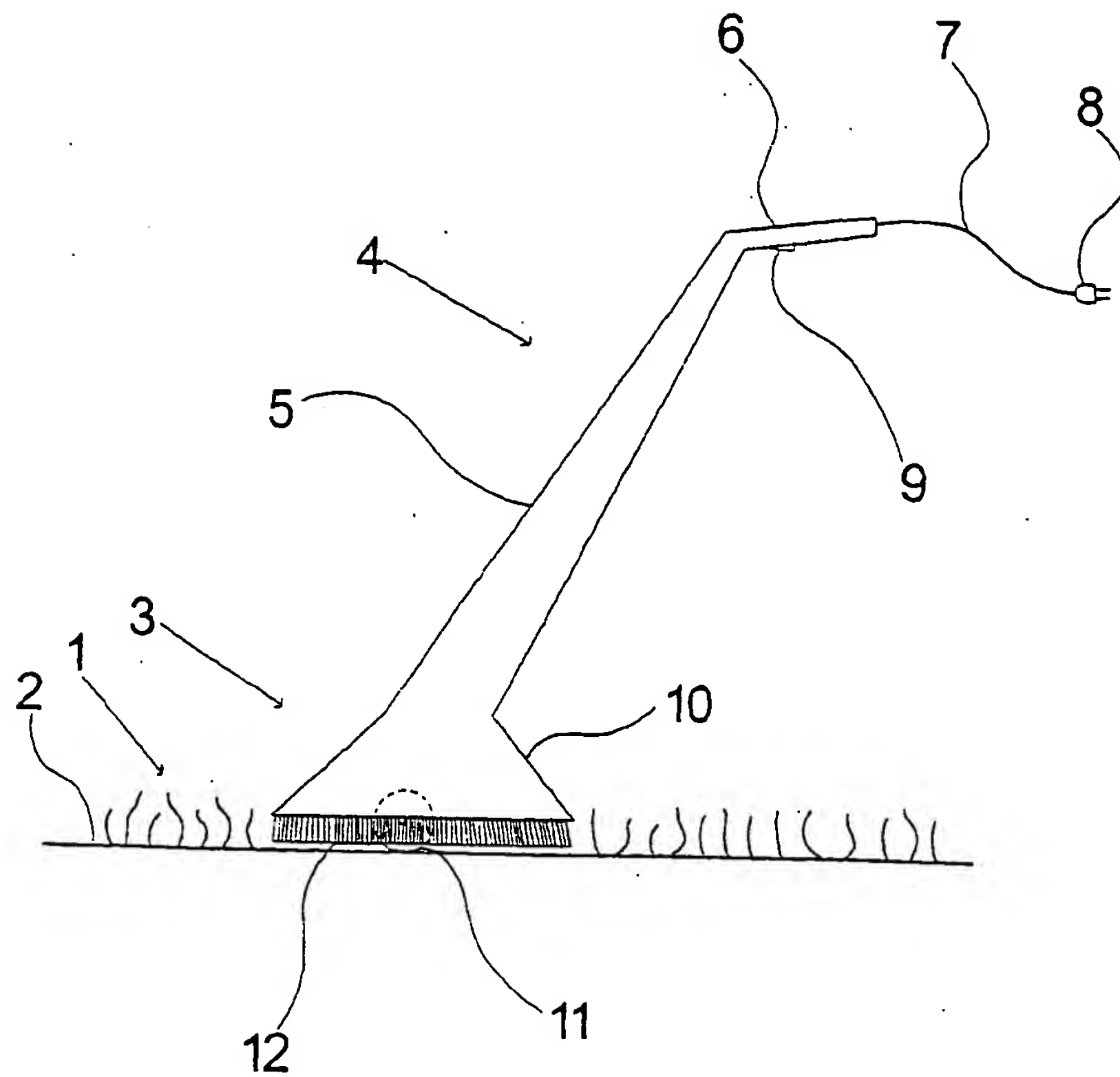
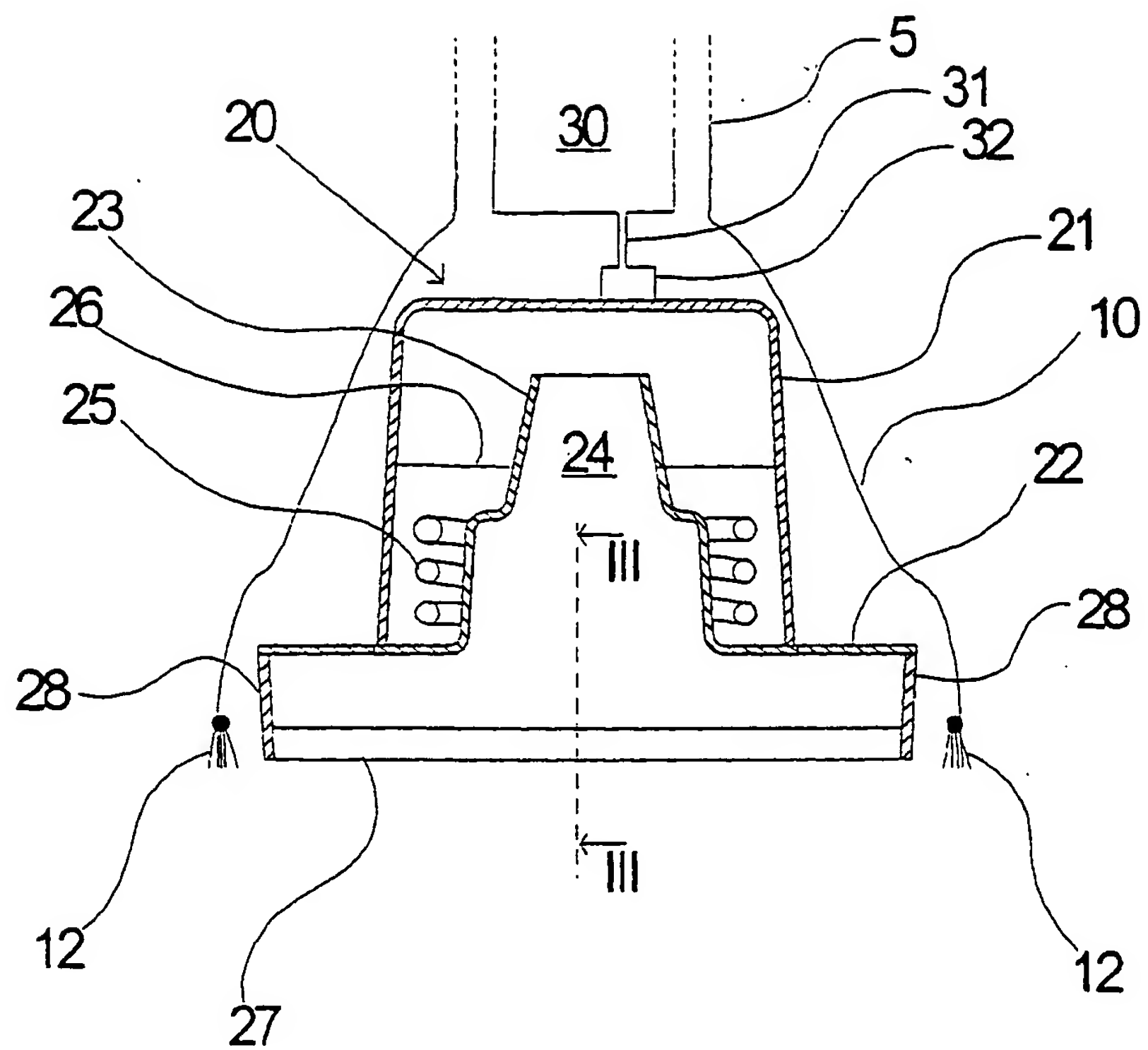
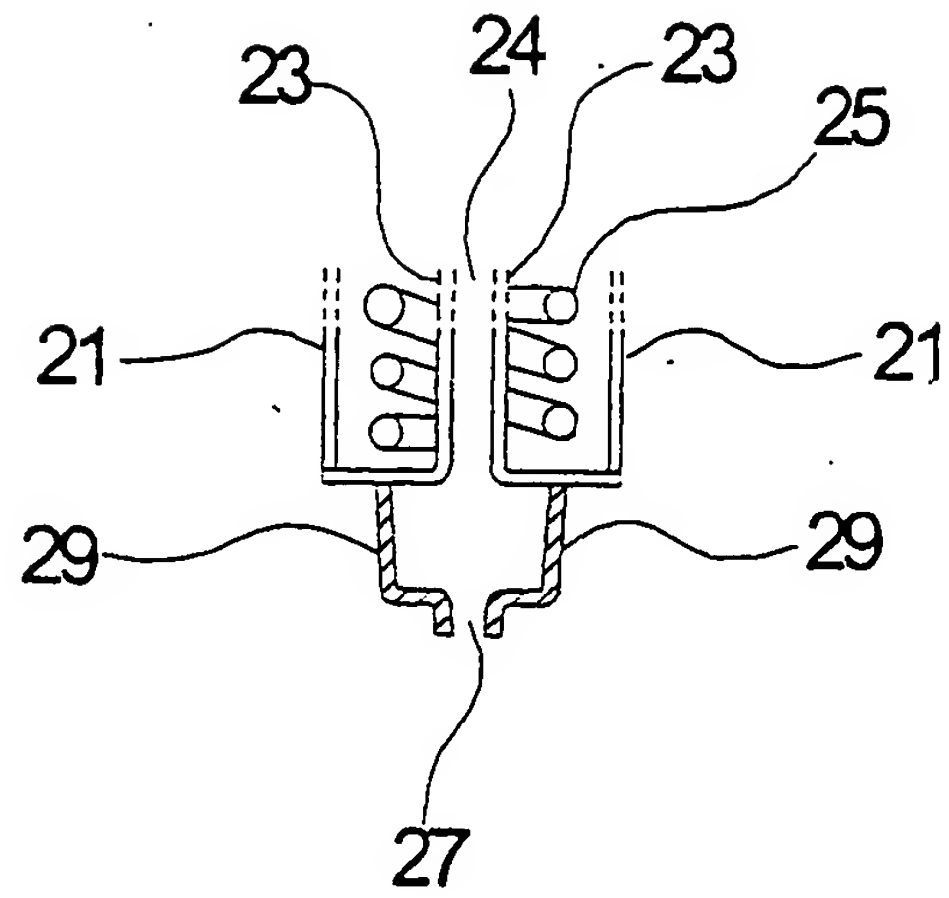


Fig. 1



*Fig. 2*



*Fig. 3*

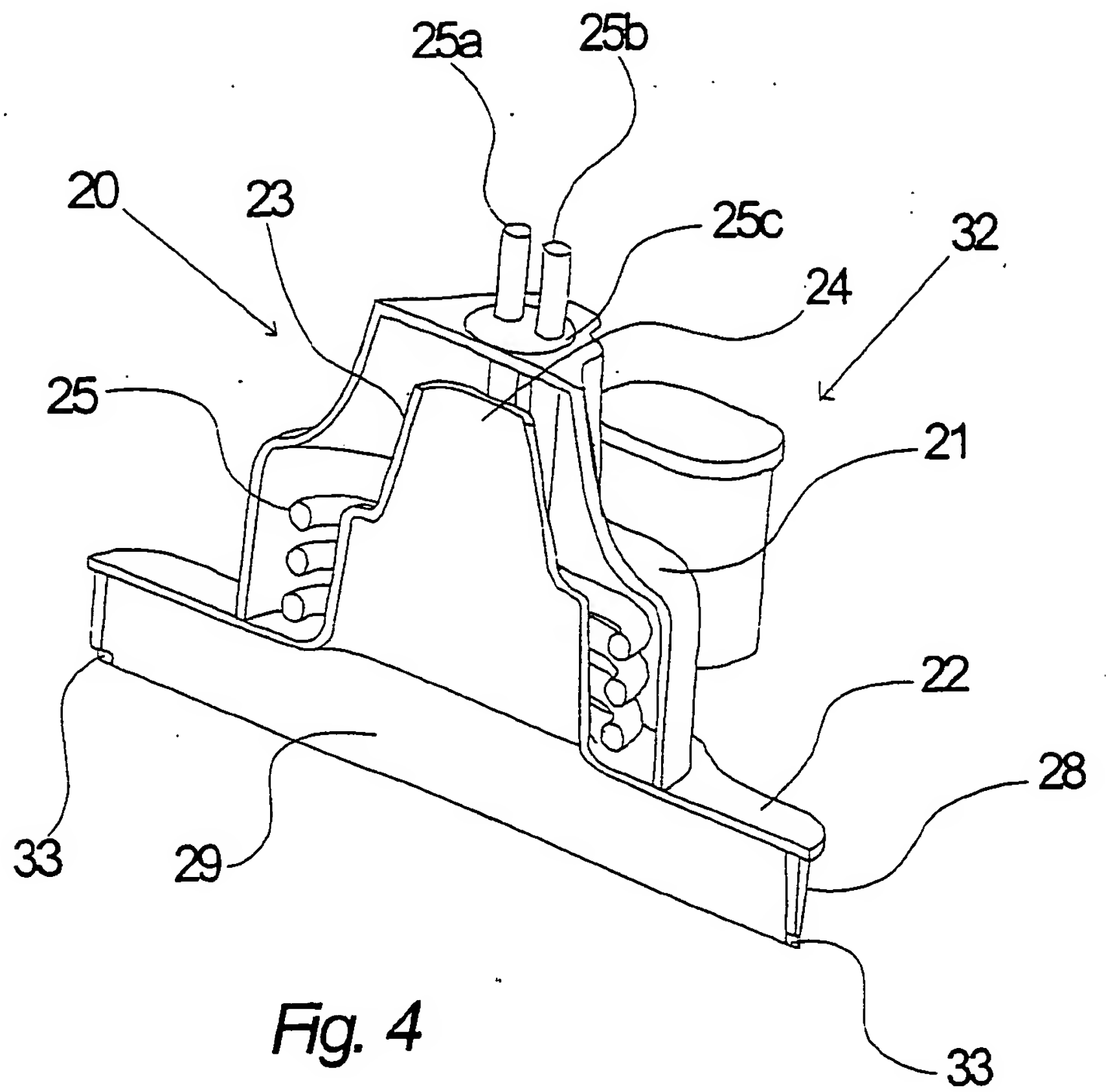


Fig. 4

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## EUROPEAN SEARCH REPORT

Application Number  
EP 00 20 3144

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Inv.C1.7)
A	US 5 385 106 A (LANGSHAW ERIC) 31 January 1995 (1995-01-31) * column 2, line 36 - column 3, line 5 * * column 3, line 20 - line 38 * * claims; figures 1-3 *	1,8, 13-16,18	A01M21/04 A01G11/00
A	EP 0 920 802 A (FISKARS DANMARK A S) 9 June 1999 (1999-06-09) * column 2, line 51 - column 4, line 9 * * claims; figures *	1,8,13, 15,16,18	
A	WO 99 38378 A (NEWSON RICHARD JOHN) 5 August 1999 (1999-08-05) * page 3, line 21 - page 5, line 14 * * claims; figures *	1,8,13, 15,16,18	
			TECHNICAL FIELDS SEARCHED (Inv.C1.7)
			A01M A01G
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>1 February 2001</b>	Examiner <b>Piriou, J-C</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document I : theory or principle underlying the invention C : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons R : member of the same patent family, corresponding document			

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01-02-2001

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